REMARKS

Claim 7 has been cancelled without prejudice, because the recitation in Claim 7 is already present in Claim 1. Cancellation of this claim is not being done in view of the citation of art by the Examiner.

At the time of submission of Preliminary Amendment "C", which was filed simultaneously with the present RCE application, applicants filed a Declaration Of Prior Invention Under 27 C.F.R. § 1.114, and a supporting Petition for acceptance of the Declaration without the signature of two of the inventors, who could not be located. The Petition was dismissed because the Petitions Examiner did not believe that an adequate effort had been made to locate the inventors whose signatures were missing from the Declaration. On February 25, 2008, applicants submitted a "Response to Decision Dismissing Petition" and accompanying documents which showed that, although one of the inventors had been located, and his signature obtained, a diligent effort to reach the second inventor had not been successful. On March 20, 2008, applicants received a decision granting a renewed petition, filed February 25, 2008, under 37 C.F.R. §1.183 to waive the single missing signature on the 37 C.F.R. §1.131 Declaration.

In the Declaration Under 37 C.F.R. § 1.131 (a copy of which is re-submitted herewith for reference purposes), the inventors state that they had in hand the invention claimed in the present application before the January 6, 2004 filing date of U.S. Patent Application Serial No. 10/752,885, the Kirkpatrick reference. As evidence that this is true, the inventors provided, as an Exhibit, the "Invention Alert" (Disclosure of Invention) which they submitted to their employer, Applied Materials, Inc. prior to the January 6, 2004 filing date of the Kirkpatrick reference. In view of the content of the Invention Alert, it is clear that the new and non-obvious

subject matter contained in the presently pending independent claims was in the hands of the inventors prior to the filing date of the Kirkpatrick reference. (A copy of the Invention Alert is re-submitted herewith for reference purposes)

In the currently claimed invention, there is some widening of the ranges claimed for temperature and vacuum application time over that described in the Invention Alert (which is a basic minimum description prior to application preparation). The widened ranges are based on continued experimentation subsequent to submission of the Invention Alert and prior to filing of the application; and, are based on the desire of the inventors to make certain that the ranges were adequate to protect their invention. In addition, the inventors recited a pressure range at which the vacuum may be applied, which is within the range of vacuum pumps generally available for use within the semiconductor industry at the time of filing the application. Further, the range of vacuum recited in the claims was (and is) achievable in the TETRA Etcher which was discussed in the Invention Alert.

With particular reference to the Invention Alert, there is apparently no page 1, which must be part of an accounting record. The first page of the Invention Alert is referred to below as Page 2, with all other pages following in continuous order.

The novel and non-obvious elements of independent Claim 1 are described in the Invention Alert at Page 3 under "3."; at Page 5, through Page 6, under "5)"; and, at the bottom of Page 6 in the last paragraph.

The novel and non-obvious elements of independent Claim 8 are found at Page 5 under "4)"; at Page 6, under "8"; and at Page 7 (paragraph at the top of the page).

The novel and non-obvious elements of independent Claim 15 are the same as for independent Claim 8. Claim 15 contains additional detail in the form of steps which are generally known in the art of manufacture of a photomask, but the combination of these steps with other novel and non-obvious steps discovered by the inventors provides a combination in the present claims which is novel and non-obvious.

Claim Rejection Under 35 U.S.C. § 103(a)

Claims 1 - 17 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over Kirkpatrick (U.S. Patent Application 2006/0084229) in view of Itoh (U.S. Patent Application 2004/0058279).

Applicants maintain their arguments presented in Preliminary Amendment "C" and Response "B" of the present record. These arguments show that their invention is patentable over the Kirkpatrick reference. The Kirkpatrick reference when read as a whole does not even suggest the invention claimed by the applicants.

However, since applicants' Petition Under 37 C.F.R. §1.183 has been granted, as provided in the copy mailed March 20, 2008, the Kirkpatrick reference is not prior art to the present invention, for the reasons previously argued. .

As previously discussed, the Kirkpatrick et al. application, which was published on April 20, 2006 (as Pub. No. 2006/0084299), was filed on December 2, 2005, while the present application was filed on April 2, 2004. The application which was published on April 20, 2006 does not qualify as a reference under 35 U.S.C. §103(a), which requires that the differences sought to be patented must be obvious over the prior art. That which is prior art is defined under

35 U.S.C. § 102. None of the other sections under 35 U.S.C. § 102 qualify the Published Application 2006/0084229 as prior art, and therefore, this published application does not meet the requirements for prior art under 35 U.S.C. § 103(a).

In particular, the only possible qualification of a Kirkpatrick reference as prior art would be under 35 U.S.C. § 103(a) /35 U.S.C. § 102(e)(2), and is U.S. Application No. 10/752,885, which was filed on January 6, 2004, which was published as U.S.2004/0266113 on December 30, 2004, and which issued as U.S. Patent No. 7,018,925 on March 28, 2006. However, applicants' invention was made prior to the Invention Alert prepared by the inventors on November 21, 2003 and acknowledged by the Applied Materials' docketing department on December 17, 2003.

Kirkpatrick Application No 10/752,885, filed January 6, 2004, is preceded by applicants' invention, as discussed above and therefore is not prior art. This leaves only the Itoh reference as prior art. The Itoh reference is currently cited for teaching that electron beam or optical radiation is commonly used in the patterning of photoresists of the kind which are used to fabricate photomasks. Applicants novel and non-obvious features do not depend on the naming of the radiation source which is used to image the photoresist.

The Itoh Patent Application relates to a problem of constantly changing size of a latent pattern which is being written into a photoresist using a direct write process. This change in dimension of the written latent pattern is significant because it takes a long period of time (8 - 20 hours) to direct write (write with an electron beam, for example) an entire pattern over a photoresist surface. This compares with patterning done by blanket radiation through a mask (which happens in seconds). The Itoh reference describes a specialty material for use in pattern formation (a photoresist material) for electron beam lithography, which contains an alkali-soluble resin, a photoacid generator and dissolution inhibiting groups. The invention also provides a method of photomask fabrication which makes use of the specialty photoresist material. While related to the fabrication of a photomask, the Itoh reference teaches an invention which is clearly

distinguishable from applicants' invention, and makes no suggestion which might lead one of skill in the art in the direction of applicants' invention.

As previously discussed, Figure 2 of the Itoh reference shows the change in the size of the image which is written by the e-beam as a function of time. For experimental purposes, an image was written on several samples, each of which was then allowed to "stand in a vacuum" for a different time period. The dimensional changes of the individual samples were subsequently plotted on a graph. Each aging sample was placed in a vacuum box for its aging time period, because e-beam writing is carried out under a vacuum. This was an attempt to imitate conditions which would be experienced by the photoresist during e-beam writing of an image. Since the dimension of the irradiation beam written used for writing by the irradiation tool remains constant, the difference between the initially written pattern dimension and the pattern on an aged test specimen represents the changing size of the image during the writing process, which is dependent on the molar ratio of the first and second dissolution groups present in the photoresist. (Col. 9, lines 19 - 39.)

It is important to point out that after careful review of the Itoh reference, applicants' attorney was not able to find any indication of the amount of vacuum which was applied during the testing of the various materials which were evaluated as potential photoresist materials. While there is a reference to "standing under vacuum", there is no specification of any units for the vacuum. Further, the Itoh reference fails to even suggest that vacuum be applied subsequent to the e-beam writing of a latent image into a photoresist. The only concern is whether the proper evaluation of photoresist materials is made in view of the process used for writing of the image.

There is no vacuum treatment step in any of the Itoh et al. reference claims. This is because the vacuum referred to is not part of the process described for developing a pattern in the photoresist or for using the patterned photoresist to transfer the pattern to a radiation-blocking layer of the photomask.

There is nothing in the Itoh et al. reference which even suggests that a photomask with a patterned photoresist on its surface should be subjected to a vacuum to alter the overall behavior an imaged photoresist in processing steps subsequent to imaging. "The issue with respect to obviousness is whether a challenger has carried its burden of proving, by clear and convincing evidence, facts from which it must be concluded that one skilled in the art at the time the invention was made would have found it to have been obvious, from the references as a whole, to create the claimed subject matter as a whole", *Datascope Corp. v. SMEC, Inc.*, 776 F2d 320, 227 U.S.P.Q. 838 (Fed.Cir.1985). In the present instance, there is nothing in the Itoh et al. reference which would lead one skilled in the art in the direction of applicants' invention. It is impermissible to use a claimed invention as an instruction manual or "template" to piece together teachings from the prior art in an attempt to render the claimed invention obvious. "[O]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q.2d 1780, 1784 (Fed. Cir. 1992).

Unlike Itoh, applicants are not developing a specialized photoresist (a specialized pattern formation material) in an attempt to provide an irradiated image dimension which remains substantially constant over an extended period of pattern writing time. Applicants are leaving this effort to the manufacturers of the photoresist materials.

Applicants are trying to improve the performance of the photoresist subsequent to writing of the pattern into (imaging of) the photoresist. Applicants determined that, for any of the chemically amplified photoresists, it is helpful to use a processing step in which a vacuum ranging between 5×10^{-6} mTorr to about 5 mTorr is applied to the photoresist as it is present on the photomask substrate, after completion of writing the irradiated pattern. Exposure of the imaged photoresist to the specified vacuum improves the critical dimension and uniformity of the imaged pattern in the photoresist. This vacuum treatment "allows reaction by-product (which remains after pattern irradiation), water vapor, and solvents, for example to desorb from the

surface of the resist, improving critical dimension uniformity across the surface of the photoresist on the photomask substrate" (Paragraph [0015] at Page 5, lines 7 - 13 of the present application Specification.)

Further, exposure of a developed photoresist to the specified vacuum improves the line edge roughness of pattern openings of the developed photoresist.

Applicants' technique of vacuum treating the non-developed photoresist prior to wet development, or of vacuum treating the photoresist after wet development of the pattern, is applicable to all photoresists on the market, including the one described in the Itoh et al. reference. The Itoh et al. reference does not even suggest applicants' invention, which takes place subsequent to pattern irradiation.

In view of the disqualification of the Kirkpatrick reference as prior art, and the above arguments and distinctions over the Itoh reference, the Examiner is respectfully requested to withdraw the rejection of Claims 1 - 17 under 35 U.S.C. § 103 (a) as being unpatentable over Kirkpatrick (U.S. Patent Application 2006/0084229) in view of Itoh (U.S. Patent Application 2004/0058279).

Applicants contend that the claims as amended herein are allowable, and the Examiner is respectfully requested to pass the application to allowance.

If the Examiner would like to discuss any of the issues with respect to patentability of the amended claims, the Examiner is invited to contact applicants' attorney at the telephone number provided below.

Respectfully submitted,

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